

# Workshop Without Walls: Upstairs Downstairs

## Breakout Group 4 Note-taking

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*Resolved: Plate Tectonics Do Not Matter!*

*Focus Questions: What would we like to know, that we don't know now?*

*What would we like to measure?*

- Stability is key - does this require exposed land? → what kind of life do we care about?
- Magnetic field → an indicator of convection, and thus plate tectonics?
- How do we define tectonics? Rigid crust that moves? Dynamics of the lithosphere
- Should we try to measure land AND water? Do you need both for life and stability?
- So, do we need plate tectonics for life?
  - we need nutrient cycling, i.e., new material to the surface
  - \*\*we need disequilibrium, not necessarily new material
- Measuring continents and water
- Measuring CO<sub>2</sub>? Low CO<sub>2</sub> might indicate stability (Earth compared to Venus, Mars) if not a direct indication of life
- Plate tectonics strongly influences styles of volcanism → types of rocks
  - if we could measure albedo, this could tell us about types of rocks and water to land ratios
- Can we learn anything about volcanic activity through measuring atmospheric gases?
  - the oxidation state of the gases would be very helpful
  - the amount of atmospheric water → more H<sub>2</sub>O = subduction?
- What can we actually learn from looking at one pixel?
  - we could learn more from seeing changes with time
- How do plate tectonics influence atmospheric composition?
- We'd like to know whether or not the atmosphere is in equilibrium with the planetary surface → this would indicate no plate tectonics and no life?
- What about heat?
- Different stellar systems have different inventories of radioactive elements
- Can we measure the age of the system? Can this be estimated by the metallicity of the star?
- We care about steady disequilibrium as most favorable for life

Summary:

Measurables: Continents vs. water, atmosphere oxidation state, as much compositional information about the star and planets,